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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/988,660
Filing Date: November 20, 2001
Appellant(s): MYERS ET AL.

Jeffrey G. Killian
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 4 November 2005 appealing from the Office action mailed 23 March 2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows:

This appeal involves claims 4, 9-13, and 15-20 (appellant indicates on pg. 6 of appeal brief filed 4 November 2005 that the grounds of rejection to be reviewed on appeal consists of the obviousness of claims 4, 9-13, and 15-20 under 35 U.S.C. 103(a)).

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

GROUNDS OF REJECTION NOT ON REVIEW

The following grounds of rejection have not been withdrawn by the examiner, but they are not under review on appeal because they have not been presented for review in the appellant's brief. Claims 6 and 14 are unpatentable under 35 U.S.C. 103(a) as being unpatentable over Howard *et al.* (US 4,507,551) in view of Appellant's Admitted Prior Art, Amos (US 5,369,511), and Ben Menachem *et al.* (US 2001/0029816) as applied to claim 4 above, and further in view of Tennant *et al.* (US 6,034,407).

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

4,507,551	HOWARD et al.	3-1985
5,369,511	AMOS	11-1994
6,034,407	TENNANT et al.	3-2000
2001/0029816	BEN-MENACHEM et al.	10-2001

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

<u>Sole issue:</u> *Claims 4, 9-13, and 15-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Howard et al. (US 4,507,551) in view of Appellant's Admitted Prior Art, Amos (US 5,369,511), and Ben-Menachem et al. (US 2001/0029816).*

In regard to claims **4**, **9-13**, and **15-20**, Howard *et al.* disclose (Fig.) an infrared imaging apparatus, comprising:

(a) a dewar (10), having an internal volume that defines a cold space;

(b) an IR transmissive window (28) that seals the cold space to receive IR energy directly from an IR source;

(c) a first lens (12) located within the cold space to receive IR energy directly from the IR transmissive window (28), wherein the first lens (12) is made of germanium (column 2, lines 63-68);

(d) an IR detector (14) located within the cold space in operational communication with the first lens (12); and

(e) an optical stop (16) located within the cold space in front of the first lens (12).

While Howard *et al.* also disclose (column 2, line 9 to column 3, line 30) using well known techniques of lens system design in order to obtain a desired field of view, the apparatus of Howard *et al.* lacks an explicit description that the first lens (12) is an aspheric silicon lens with a first aspheric profile (*e.g.*, radius=-0.94467, k=28.345216; a=-2.13952, b=-69.5274, c=2342.04, d=-56841.9, and first surface thickness=0.548467 or radius=-1.23508; k=36.049455; a=-1.69104; b=-98.6413; c=5589.83; d=-162359; and first surface thickness=0.761661) on a first side and on a second side facing the detector and parallel to the first side, a second aspheric profile (*e.g.*, radius=-0.61281; k=0.1399; a=0.033459; b=-2.3598; c=10.889; d=-36.331; and second surface thickness=0.462731 or radius=-0.81270; k=-0.10748; a=0.054475; b=-0.72423; c=2.9155; d=-7.8939; and second surface thickness=0.480234) having a holographic optical element (*e.g.*, -0.0051393, -0.10212, 0.91035, -2.3946 or -0.017112, -0.038991, 0.55069, -1.6405) for color correcting a first color band of infrared energy having wavelengths of 3 to 5 micrometer and coincidently focus at the common focal plane the

first color band a second color band of infrared energy having wavelengths of 8 to 12 micrometer such that at least a first IR energy wavelength and second IR energy wavelength (which is a harmonic component of the first wavelength) is at a position coincident (*i.e.*, common focal plane) to the IR detector (14) so as to provide a square field of view of 90X90 degrees with an F-stop (F/#) of at least 1.4.

However, techniques of lens system design comprising aspheric surfaces are well known in the art. For example, Appellant admits (paragraph 0027) it is well known in the art to use commercially available software for designing aspheric lens. Further, Ben-Menachem *et al.* teach (paragraphs 0002, 0003, and 0075) that a single element (*e.g.*, an aspheric silicon lens for the infrared wavelength regions) with a diffractive element on an aspheric surface provides optimum design benefit wherein residual aberrations are corrected. In addition, Amos teaches (column 18, line 43 to column 19, line 9) that diffractive components (such as holographic optical elements) added to a refractive lens results in all wavelengths of the light being combined at a point or focus and that that the principles of the instant invention are applicable to the entire electromagnetic spectrum (column 5, lines 11-15). Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an aspheric silicon lens with a holographic optical element in the apparatus of Howard *et al.*, in order to correct for optical aberrations and coincidently focus first and second color bands so as to obtain a desired field of view (*e.g.*, a square field of view of 90X90 degrees with an F-stop (F/#) of at least 1.4) in both the first and second color bands.

(10) Response to Argument

Appellant argues (second paragraph on pg. 6 to second paragraph on pg. 8 of appeal brief filed 4 November 2005) that the HOE of Amos cannot function to correct a first color band of infrared energy having wavelengths of 3 to 5 micrometer and coincidently focus at a common focal plane the first color band and a second color band of infrared energy having wavelengths of 8 to 12 micrometer as presently claimed since Amos at best corrects multiple bands of energy that are much closer in wavelength than that claimed. Examiner respectfully disagrees. Amos states (column 18, lines 47-60) that " ... one may employ ... diffractive components such as holographic optical elements ... binary optics techniques add a notched diffractive component to the refractive lens so that chromatic aberration is corrected. This results in all wavelengths of the light being combined at a point or focus" and (column 5, lines 11-15) that "It is again emphasized that the principles of the instant invention are applicable to the entire electromagnetic spectrum and are not limited to conventional holography or to the visual or near-visual spectra, such as ultraviolet and infrared frequencies or X-rays". Thus Amos expressly teaches the principle of adding diffractive components to a refractive lens in order to <u>combine light at a point or focus</u> and that this principle is applicable over the <u>entire</u> electromagnetic spectrum. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide an aspheric silicon lens with a holographic optical element in the apparatus of Howard *et al.*, in order to correct for optical aberrations and coincidently focus first and second color bands so as

to obtain a desired field of view (*e.g.*, a square field of view of 90X90 degrees with an F-stop (F/#) of at least 1.4) in both the first and second color bands.

Appellant then argues (third paragraph on pg. 8 to second paragraph on pg. 9 of appeal brief filed 4 November 2005) that the elements in Ben-Menachem *et al.* cannot correct a first color band of infrared energy having wavelengths of 3 to 5 micrometer and coincidently focuses at the common focal plane the first color band and a second color band of infrared energy having wavelengths of 8 to 12 micrometer as presently claimed since the elements in Ben-Menachem *et al.* operate on only one of the two claimed wavelength ranges citing the use of "or " in paragraph 60 of Ben-Menachem *et al.* In response to appellant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, Ben-Menachem *et al.* state (paragraph 0075) that " ... Diffractive optical element patterns are produced by machining, on the surface of the element, a diffractive structure ... used to further correct for residual aberrations present in the element. In this way, the optimum design benefit can be obtained from a single element. Diffractive optics patterns can be applied to any surface, whether flat, spherical or aspheric". Thus Ben-Menachem *et al.* explicitly teach that a single element (*i.e.*, aspheric silicon lens) with a holographic optical element on an aspheric surface provides optimum design benefit such as correction of aberrations. Further as discussed above, Amos expressly teaches that a holographic optical element added to

a refractive lens brings all wavelengths of infrared light to a focus. Therefore the obvious combination of the cited references disclose, teach or suggest all recited claim limitations including a holographic optical element on an aspheric surface which corrects a first color band of infrared energy having wavelengths of 3 to 5 micrometer and coincidently focus at a common focal plane the first color band and a second color band of infrared energy having wavelengths of 8 to 12 micrometer.

Appellant further argues (third paragraph on pg. 9 to fourth paragraph on pg. 10 of appeal brief filed 4 November 2005) that the positioning of a detector at the focal plane of a single lens within a cryogenic assembly as recited in the claims produced unexpected results of better form factor, lower part count, reduced manufacturing and assembly tolerances, reduced precision alignment requirements, using existing cooling capabilities, contamination protection, and elimination of thermal transients which rebut any prima facie case of obviousness established by the rejection. Examiner respectfully disagrees. In regards to allegations of unexpected results, the issue is whether the properties differ to such an extent that the difference is really unexpected (MPEP § 716.02) and prima facie obviousness is not rebutted by merely recognizing additional advantages or latent properties present in the Prior Art (MPEP § 2145). It is noted that the alleged unexpected results flow from the structure of a single lens and a detector within a cryogenic assembly. As discussed above, Howard *et al.* disclose (Fig.) an infrared imaging apparatus, comprising: (a) a dewar (10), having an internal volume that defines a cold space; (b) an IR transmissive window (28) that seals the cold space to receive IR energy directly from an IR source; (c) a first lens (12) located within

the cold space to receive IR energy directly from the IR transmissive window (28), wherein the first lens (12) is made of germanium (column 2, lines 63-68); and (d) an IR detector (14) located within the cold space in operational communication with the first lens (12). Thus Howard *et al.* teach a single lens and a detector within a cryogenic assembly as recited in the claims. Further, appellant does not explain why the Prior Art cryogenic assembly containing a single lens and a detector which is substantially structurally similar does not also have the additional advantages or latent properties of better form factor, lower part count, reduced manufacturing and assembly tolerances, reduced precision alignment requirements, using existing cooling capabilities, contamination protection, and elimination of thermal transients. Therefore, prima facie obviousness is not rebutted since the additional advantages or latent properties of better form factor, lower part count, reduced manufacturing and assembly tolerances, reduced precision alignment requirements, using existing cooling capabilities, contamination protection, and elimination of thermal transients are <u>prima facie present</u> in the <u>substantially structurally similar</u> Prior Art cryogenic assembly containing a single lens and a detector.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

SL
28 December 2005

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